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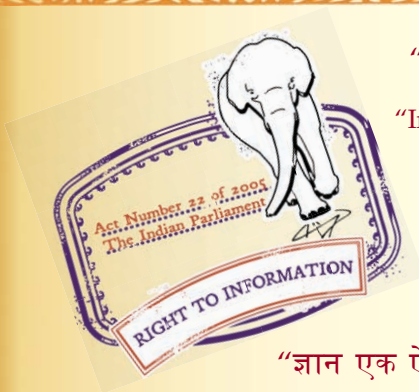
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“Step Out From the Old to the New”

IS 9819-3 (1982): Line Output Transformers (EHT) Used with TV Picture Tubes, Part 3: Type Lot 1h for 470 mm, 510 mm, 590 mm and 610 mm TV Picture Tubes [LITD 5: Semiconductor and Other Electronic Components and Devices]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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SPECIFICATION FOR LINE OUTPUT TRANSFORMERS (EHT) USED WITH TV PICTURE TUBES

PART III TYPE LOT 1H FOR 470 mm, 510 mm, 590 mm AND 610 mm TV PICTURE TUBES

0. General — This standard shall be read in conjunction with IS:9819 (Part I)-1981 ' Specification for line output transformers (EHT) used with TV picture tubes: Part I General requirements and tests '.

1. Type Designation—This line output transformer shall be designated as line output transformer LOT 1H.

LOT — means line output transformer

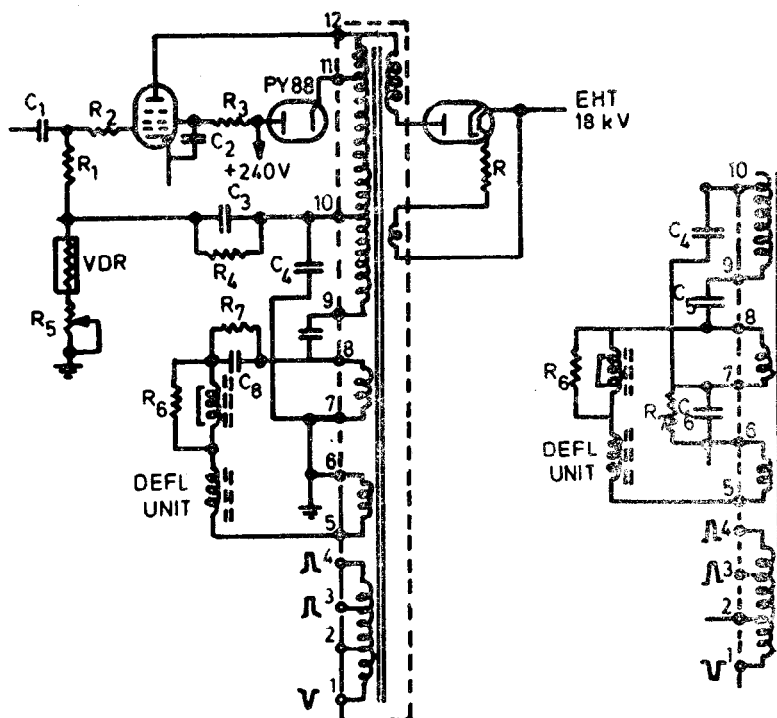
1 — represents TV picture tubes of sizes 470 mm, 510 mm, 590 mm and 610 mm

S — denotes hybrid circuitry

2. Application --- This line output transformer is meant to provide the required scanning amplitude for 470 mm, 510 mm, 590 mm and 610 mm TV picture tubes in television receivers presenting 625 lines at 50 frames per second. It is intended for use in conjunction with:

- a) deflection coil unit DCU 1H, and
- b) linearity control unit LCU 1H.

Typical application schematic diagram is shown in Fig. 1.



- C₁ 4 700 pF ceramic
C₂ 22 000 pF ceramic
C₃ 270 pF ceramic, 1 000 V dc
C₄ 120-390 pF ceramic, 2 000 V p-p' amplitude
adjustment
C₅ 27 000 pF } Paper, 1 300 V
C₇ 56 000 pF } booster capacitors
C₈ 0.22 μF (5%)
C₉ 0.27 μF (5%) } (S-Correctors')

- R_1 2·2 M Ω , 1 200 Vp-P**
 R_2 1 000 Ω , $\frac{1}{2}$ W
 R_3 2 200 Ω , 2 W
 R_4 $2 \times 8 \cdot 2$ M Ω , 600 V dc each
 **R_5 0·5 M Ω Potentiometer, booster
 voltage adjustment**
 R_6 1 500 Ω 1 W
 R_7 2 700 Ω 1 W

FIG. 1 SCHEMATIC DIAGRAM

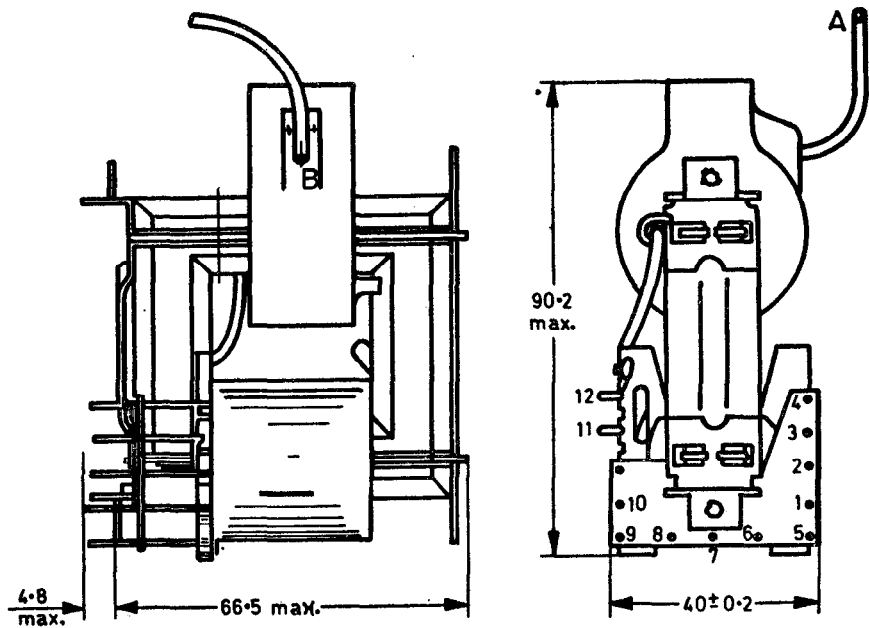
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3. Description— The line output transformer shall have primary, secondary, auxiliary and EHT windings wound on a ferrite core with suitable resin impregnation/encapsulation. The transformer shall meet the self extinguishing and non-dripping requirements of IS : 616-1981 'Safety requirements for mains operated electronic and related apparatus for household and similar general use (first revision)'.

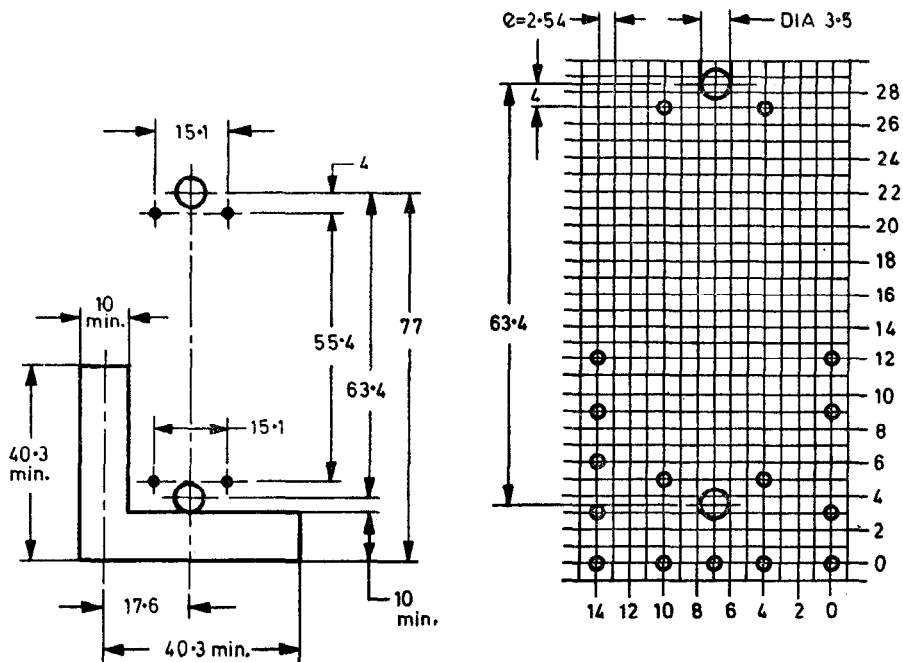
4. Mechanical Data — The outline and the the dimensions shall be according to Fig. 2.



All dimensions in millimetres.

FIG. 2 OUTLINE AND DIMENSIONS

5. Mounting— The line output transformer shall be provided with four mounting pins and two threaded holes for mounting. The line output transformer may be mounted on either a printed wiring board or a metal chassis as detailed in Fig. 3.



All dimensions in millimetres.

FIG. 3 MOUNTING

Certain minimum distances as detailed below shall be maintained between the line output transformer and the neighbouring components and shields.

- a) The radial distance between EHT coil and any metal part should be at least 25 mm,
- b) The axial distance from the EHT coil shall be at least 15 mm,
- c) The distance between EHT cap and lead shall be at least 25 mm, and
- d) The distance between the primary and any metal part shall be at least 10 mm.

In the design of printed wiring board, the following peak pulse voltages shall be taken into account:

Connection — 1	— 110 V pp
3	+ 110 V pp
4	— 220 V pp
5	— 500 V pp
9	+ 500 V pp
10	+ 1 100 V pp

Ample cool air circulation shall be provided around the line output transformer.

6. Electrical Specifications

6.1 General Electrical Data

6.1.1 Inductance of winding

Connections 5-6/7-8 $3.2 \text{ mH} \pm 10\%$

6.1.2 Leakage Inductance of winding connection

5-6/7-8 with EHT and
other windings shorted } $= 50 \mu\text{H} \pm 10\%$

6.1.3 Winding resistances

5-6 = 7-8 $= 0.45 \text{ ohms} \pm 10\%$

12-13 = 100 ohms $\pm 10\%$

6.1.4 Voltage proof — The EHT winding of the line output transformer shall withstand without breakdown to the core a peak pulse voltage of 6kV and 7 μ sec width, PRF 15 kHz for one minute.

The high voltage rectifier mounting assembly, filament lead and the EHT cable shall withstand without breakdown a voltage of 25 kV 50Hz for one minute.

6.1.5 Induced high voltage — A pulse voltage of appropriate pulse width and repetitive frequency without saturating the line output transformer is applied to one of the windings to enable 21.6 kV be induced in the EHT winding and kept for 4 minutes.

The low end of EHT winding be grounded during this test. There shall be no corona discharge during test.

6.2 Dynamic Performance Data — The following electrical performance data are measured on 610 mm TV picture tube with a booster load at connection (9) of 1 mA and a capacitance of 100 pF between connection (5) and (8) at different values of capacitor C4 and using selenium stack.

TYPICAL VALUES

C4	120pF		270pF		390pF		
Beam current	35	400	85	400	35	400	μA
Supply voltage	240	235	240	235	240	235	V
Booster voltage	630	608	640	617	646	625	V
EHT voltage	17·8	16·2	17·8	16·1	17·8	16·2	kV
Auxiliary voltage between (1) and (2)	—	—	— 110		—	—	Vp-p
Auxiliary voltage between (3) and (2)	—	—	+ 110		—	—	Vp-p
Auxiliary voltage between (4) and (2)	—	—	+ 220		—	—	Vp-p
Average booster current	90	125	90	125	90	125	mA
Peak booster current	260	—	260	240	255	—	mA
Peak booster voltage	5·5	—	5·6		5·1		kV
Peak cathode current	—	—	290	365	—	—	mA
Peak anode current	—	—	270	335	—	—	mA
Peak anode voltage	6·8	—	6·8	—	6·75		kV

When diode is used instead of selenium stack the above remain valid except the following:

Beam current	35	400	35	400	35	400	μA
Supply voltage	240	235	240	235	240	235	V
Booster voltage	615	601	625	610	631	618	V
EHT voltage	17·25	16·2	17·25	16·1	17·25	16·2	kV
Average booster current	102	133	102	133	102	133	mA

(with PY88)

Note — The line output transformer should not be left floating but must be connected to the chassis.

The operation of the line output transformer is influenced by its surroundings, variations in electrical characteristics due to the influence of the surrounding components, shields and circuitry can be compensated to a certain degree by selecting the right value of the capacitor C4.

The deflection unit is connected to the secondary which is separated from the primary by the booster capacitor C7. Pulses for blanking, synchronization, etc, are to be taken directly from the deflection unit connections. A circuit diagram of a flywheel synchronization is given in Fig. 4.

The split secondary offer possibilities of alternate connections as detailed in Fig. 4. The conventional circuit is obtained with booster capacitor C-7-56nF and S correction capacitor C8-270nF $\pm$ 5 percent. If, however, the S correction capacitor is placed between the two halves of the secondary, the booster capacitance has to be reduced considerably. (27nF instead of 56nF) because the parabola voltages on C6 and C5 are of opposite sign. Besides, the S correction capacitor has to be reduced (220nF).

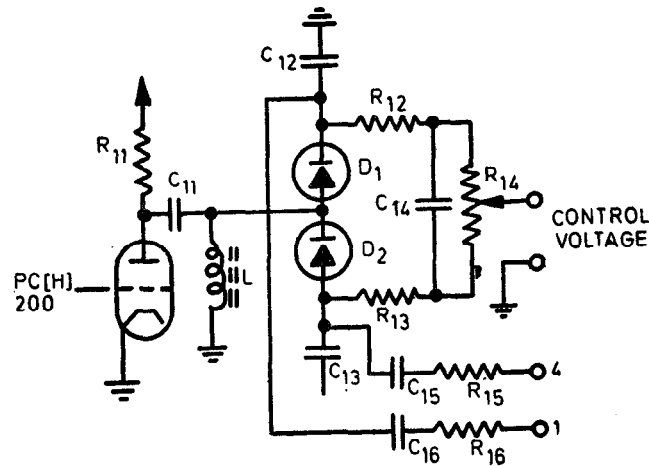
7. Marking — See 6 of IS : 9819 (Part I)-1981.

8. Material, Construction and Workmanship — See 5 of IS : 9819 (Part I)-1981.

9. Classification of Tests — See 7.2 of IS : 9819 (Part I)-1981.

9.1 General Conditions for Tests — See 7.1 of IS : 9819 (Part I)-1981.

9.2 The test schedule and the requirements shall be in accordance with Table 1.



C_{11} 6 800 pF, ceramic
 $C_{12}, C_{13}, C_{15}, C_{16}$ 1 000 pF, ceramic
 C_{14} 0.1 μ F, polyester
 C_{13}, C_{16} 120 pF, ceramic
 R_{11} 10k Ω , $\frac{1}{2}$ W
 R_{12}, R_{13} 39 k Ω , $\frac{1}{2}$ W
 R_{14} 5 M Ω Trimmer potentiometer
 R_{15}, R_{16} k Ω , $\frac{1}{2}$ W
 L 25-35 mH choke
 D_1, D_2 0A 202

FIG. 4 CIRCUIT DIAGRAM OF FLYWHEEL SYNCHRONIZATION

TABLE 1 TEST SCHEDULE AND REQUIREMENTS

(Clause 9.2)

Sl No.	Test	Cl Ref of IS : 9819 (Part I)- 1981	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
i) All Samples:				
a) Visual examination		7.3.1	—	The workmanship condition and finish shall be satisfactory. The marking shall be legible
b) Dimensions		7.3.2	—	The dimensions shall conform to the dimensions shown in Fig. 2
c) Continuity of winding		7.4.1	—	Each winding shall be continuous
d) dc resistance		7.4.2	—	The dc resistance shall be in accordance with 6.1.3
e) Inductance		7.4.3	—	The inductance shall be in accordance with 6.1.1
f) Voltage proof		7.4.4	—	There shall be no breakdown or flash-over or corona
g) Insulation resistance		7.4.5	—	1 000 M Ω , Min
h) Induced high voltage test		7.4.6	—	There shall be no breakdown or flash-over or corona
i) Dynamic performance test		7.4.7	—	Typical values detailed in 6.2 shall be met
ii) First Group				
a) Solderability:		7.5	—	—
1) Visual examination		7.3.1	—	There shall be no damage
2) Continuity of windings		7.4.1	—	Each winding shall be continuous
b) Robustness of termination:		7.8	—	—
1) Visual examination		7.3.1	—	There shall be no damage
2) Continuity of windings		7.4.1	—	Each winding shall be continuous

(Continued)

TABLE 1 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Cl Ref of IS : 9819 (Part I) - 1981	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
c)	Bump:	7.7	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of windings	7.4.1	—	Each winding shall be continuous
d)	Vibration:	7.8	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of windings	7.4.1	—	Each winding shall be continuous
	3) dc resistance	7.4.2	—	dc resistance in accordance with 6.1.3
	4) Inductance	7.4.3	—	Inductance shall be in accordance with 6.1.1
	5) Voltage proof	7.4.4	—	There shall be no breakdown or flash-over
	6) Insulation resistance	7.4.5	—	1 000 M ohms, <i>Min</i>
e)	Shock:	7.13	30g duration 2 days	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of winding	7.4.1	—	Each winding shall be continuous
	3) dc resistance	7.4.2	—	dc resistance shall be in accordance with 6.1.3
	4) Inductance	7.4.3	—	Inductance shall be in accordance with 6.1.1
	5) Voltage proof	7.4.4	—	There shall be no breakdown or flash-over
	6) Insulation resistance	7.4.5	—	1 000 M ohms, <i>Min</i>
f)	Acceleration:	7.14	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of windings	7.4.1	—	Each winding shall be continuous
	3) dc resistance	7.4.2	—	dc resistance shall be in accordance with 6.1.3
	4) Inductance	7.4.3	—	Inductance shall be in accordance with 6.1.1
	5) Voltage proof	7.4.4	—	There shall be no breakdown or flash-over
	6) Insulation resistance	7.4.5	—	1 000 M ohms, <i>Min</i>
g)	Climatic:	7.9	—	—
	1) Dry heat:	7.9.2	At Max category temp (70°C)	—
	i) Visual examination	7.3.1	—	There shall be no damage
	ii) Insulation resistance	7.4.5	—	There shall be no deviation from the value obtained
	2) Damp heat (cyclic) (first cycle):	7.9.5	—	—
	i) Visual examination	7.3.1	—	There shall be no damage
	ii) Insulation resistance	7.4.5	—	There shall be no deviation from the value obtained
	3) Cold:	7.9.3	—	—
	i) Visual examination	7.3.1	—	There shall be no damage
	ii) Continuity of windings	7.4.1	—	Each winding shall be continuous
	iii) Voltage proof	7.4.4	—	There shall be no breakdown or flash-over
	4) Air pressure (low):	7.9.4	1 kPa	There shall be no breakdown or failure of mechanical characteristics

(Continued)

TABLE 1 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Cl Ref of IS : 9819 (Part I)- 1981	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
	5) Damp heat (cyclic) remaining cycle:	7.9.5	—	—
	i) Visual examination	7.3.1	—	There shall be no damage
	ii) Continuity of windings	7.4.1	—	Each winding shall be continuous
	iii) dc resistance	7.4.2	—	dc resistance shall be in accordance with 6.1.3
	iv) Inductance	7.4.3	—	Inductance shall be in accordance with 6.1.1
iii)	<i>Second Group:</i>			
	a) Damp heat (long term):	7.10	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of windings	7.4.1	—	Each winding shall be continuous
	3) dc resistance	7.4.2	—	DC resistance shall be in accordance with 6.1.3
	4) Inductance	7.4.3	—	Inductance shall be in accordance with 6.1.1
	5) Voltage proof	7.4.4	—	There shall be no breakdown or flash-over
	6) Insulation resistance	7.4.5	—	1 000 M ohms, <i>Min</i>
iv)	<i>Third Group:</i>			
	a) Endurance (electrical):	7.1.5	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of windings	7.4.1	—	Each winding shall be continuous
	3) dc resistance	7.4.2	—	Dc resistance shall be in accordance with 6.1.3
	4) Inductance	7.4.3	—	Inductance shall be in accordance with 6.1.1
	5) Voltage proof	7.4.4	—	There shall be no breakdown or flash-over
	6) Insulation resistance	7.4.5	—	1 000 M ohms, <i>Min</i>
	b) Flammability:	7.16	—	Burning particles shall not detach from the components
v)	<i>Fourth Group:</i>			
	a) Mould growth:	7.11	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of windings	7.4.1	—	Each winding shall be continuous
	3) Insulation resistance	7.4.5	—	1 000 M ohms, <i>Min</i>
vi)	<i>Fifth Group:</i>			
	a) Temperature rise	7.4.8	—	The temperature rise shall not exceed 30°C
vii)	<i>Sixth Group:</i>			
	a) Salt mist:	7.12	—	—
	1) Visual examination	7.3.1	—	There shall be no damage
	2) Continuity of winding	7.4.1	—	Each winding shall be continuous